COLD WORKED METAL HOUSING FOR A PORTABLE ELECTRONIC DEVICE

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application is a continuation patent application of U.S. patent application Ser. No. 15/817,063, filed Nov. 17, 2017 and titled "Cold Worked Metal Housing for a Portable Electronic Device," which is a continuation patent application of U.S. patent application Ser. No. 14/313,505, filed Jun. 24, 2014 and titled "Cold Worked Metal Housing for a Portable Electronic Device," now U.S. Pat. No. 9,955,599, which is a continuation patent application of U.S. patent application Ser. No. 13/561,853, filed Jul. 30, 2012 and titled "Cold Worked Metal Housing for a Portable Electronic Device," now U.S. Pat. No. 8,760,866, which is a continuation patent application of U.S. patent application Ser. No. 12/706,444, filed Feb. 16, 2010 and titled "Cold Worked Metal Housing for a Portable Electronic Device," now U.S. Pat. No. 8,243,429, which is a divisional patent application of U.S. patent application Ser. No. 11/650,068, filed Jan. 5, 2007 and titled "Cold Worked Metal Housing for a Portable Electronic Device," now U.S. Pat. No. 7,688,574, the disclosures of which are hereby incorporated herein by reference in their entireties.

BACKGROUND

[0002] This invention is directed to a cold worked stainless steel bezel for a portable electronic device.

[0003] By their very nature, portable electronic devices (e.g., MP3 players, cellular telephones) are carried around and subject to impacts and inadvertent blows to which static electronic devices (e.g., desk-top computers, televisions) are not subject. To protect the electronic systems of these portable devices, manufacturers have constructed impact resistant cases.

[0004] Existing cases, however, are not always easily manufactured, aesthetically pleasing, or sufficiently resistant to impacts. Accordingly, there is a need for a hard, easily manufactured and aesthetically pleasing case for portable electronic devices.

SUMMARY

[0005] A bezel for a portable electronic device case is provided.

[0006] The bezel is configured to be releasably engaged with a housing to form the case. The bezel includes an attachment portion that extends from the outer surface of the bezel such that the attachment portion is received in a brace fastened to the housing. The brace includes a slot configured to simultaneously receive the attachment portion and a spring. The spring is configured to engage both a lip of the brace and an engagement member of the attachment portion. The brace is secured to the housing when both the brace and the attachment portion engage the spring. When the case is assembled, the bezel and the housing are flush.

[0007] The bezel may be constructed from cold worked stainless steel. By cold working the steel during or prior to manufacturing of the bezel, the steel undergoes a martensitic transformation that increases the hardness of the bezel, which may provide the bezel with desired impact and scratch resistant properties. A cold working manufacturing process also allows the bezel to be manufactured with greater precision than other manufacturing processes. This limits the post-manufacturing machining required to ensure that the bezel satisfies design tolerances (e.g., the attachment portion fits snugly in the slot of the brace, and the outer surface of the bezel is flush with the housing) and reduces costs. The bezel may also be polished to provide an aesthetically pleasing finish.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The above and other features of the present invention, its nature and various advantages will be more apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings in which:

[0009] FIG. **1** is an exploded view of a portable electronic device in accordance with an embodiment of the present invention;

[0010] FIG. **2** is a perspective view of the assembled portable electronic device case of FIG. **1** in accordance with an embodiment of the present invention;

[0011] FIG. **3** is a wire frame perspective view of the bottom of the assembled portable electronic device case of FIG. **2** in accordance with an embodiment of the present invention.

[0012] FIG. **4** is an end view of a brace and spring of the portable electronic device case of FIG. **1** in accordance with an embodiment of the present invention;

[0013] FIG. **5** is a perspective view of a spring of the portable electronic device case of FIG. **1** in accordance with an embodiment of the present invention;

[0014] FIG. **6** is a cross-sectional view of the assembled portable electronic device case of FIG. **2** in accordance with an embodiment of the present invention; and

[0015] FIG. **7** is a flow chart of an illustrative process for assembling a bezel with a housing to form the case of a portable electronic device in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

[0016] In accordance with the present invention, a cold worked steel bezel for a portable electronic device is provided.

[0017] FIG. **1** is an exploded view of the elements of an illustrative portable electronic device case in accordance with an embodiment of the invention. FIG. **2** is a perspective view of the assembled portable electronic device case of FIG. **1** in accordance with an embodiment of the present invention. Case **100** includes bottom housing **110**, brace **210**, bezel **310**, and spring **410**. Bottom housing **110** includes substantially level plate **112** that curves away from level plate **112** to form side walls **114**. Inner surface **113** of plate **112** (i.e., the surface of plate **112** that faces the electronics of the portable electronic device) can include topographical features for receiving or supporting particular electronics elements (e.g., indentations, perforations, ridges and slots).

[0018] Bottom housing **110** can be in any suitable shape. For example, bottom housing **110** can be substantially rectangular, square, elliptical, circular, irregular, or any other suitable shape. In the example of FIG. **1**, bottom housing **110** is substantially rectangular. Bottom housing **110** can include left side **120**, right side **122**, bottom **124** (not shown) and top **126**. The corners of bottom housing **110** where adjacent